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(54) GAS COMPRESSOR VALVE ARRANGEMENT WITH IMPROVED
WEAR RESISTANCE

(71) We, THERMOKING CORPORATION, of 314 West 90th Street, Minneapolis, Minnesota, United States of America, a corporation organised and existing under the laws of the State of Delaware, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates generally to valve arrangements and, more particularly, to a valve arrangement for a gas compressor.

Problems well recognized in the gas-compressor art are excessive valve noise and high wear due to friction and to the constant impacts experienced during operation by the valve surfaces operating one against the other. There are known some valve arrangements wherein either the movable valve part or the valve seat is coated with a non-metallic material which will reduce noise and, to the extent of non-metallic material employed is one having a low coefficient of friction, will also reduce valve wear due to friction.

It is the principal object of the invention to alleviate in a more reliable manner than heretofore the problem of valve wear and noise due to impact, and the invention accordingly resides in a gas-compressor valve arrangement including a suction valve and a discharge valve each comprising stationary valve surfaces and a movable valve member operating thereagainst, characterized in that at least the suction valve has said stationary valve surfaces thereof as well as the surfaces of the movable valve member operating thereagainst coated with a resilient anti-friction material.

With this novel arrangement, valve wear and noise resulting from impact and friction will be reduced due to a mutual cushioning action between the resilient coatings on the surfaces operating against each other. The resilient anti-friction material may be a suitable polytetrahalogenethylene and, preferably, is polytetrafluoroethylene.

A preferred embodiment of the invention

will now be described, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is a sectional view of a gas compressor, and

Figs. 2 and 3 are enlarged sectional views of, respectively, the discharge and suction valves of the compressor shown in Fig. 1, coated in accordance with the invention.

The gas compressor shown in Fig. 1 is a typical refrigerant compressor such as used in refrigeration systems. It comprises a cylinder with inlet ports 10 in its sleeve and a valve plate assembly 18—22 at one end of the sleeve; a reciprocating piston 4—6 disposed within the cylinder and provided with inlet passageways 10a cooperable with the cylinder inlet ports 10 and extending to the compression chamber 12 in the cylinder; a suction valve 2 associated with the inlet passageways 10a; and a discharge valve 16 associated with a discharge port or ports in the valve plate 18. The suction valve 2 is shown as a ring valve floating between a valve seat 5 on the piston end face and a valve stop 8 on the underside of the piston head 6. The discharge valve 16 is shown as a ring valve biased toward a closed valve position, i.e. against a valve seat 21 on the valve plate structure 18—20, by loading springs 24 retained in an annular groove formed in valve stop member 22 of the valve plate assembly 18—22.

The operation of the compressor is well known. As the piston 4 is reciprocating, each suction or down stroke thereof results in a pressure differential across the suction valve 2 causing the latter to open, that is, to move from the seat 5 toward and against the valve stop 8, thereby admitting gas into the compression valve stop 8, thereby admitting gas into the compression chamber 12. Upon reversal of the direction of piston movement, the pressure differential across the suction valve 2 also reverses so as to cause the suction valve to close, i.e. to move from the valve stop 8 toward and against the valve seat 5. As the piston then continues in its

compression stroke, the gas within the chamber 12 becomes compressed until its pressure exceeds the force of the load spring acting upon the discharge valve 16, and thereby causes the latter to open.

5 In accordance with the invention, a coating 15 of a resilient, low-friction kind of material, preferably PTFE, is applied to each surface of the suction valve 2, to the valve seat 5, and to the valve stop 8, (see particularly Fig. 3). In the illustrated embodiment, a similar coating 15 is applied to each surface of the discharge valve 16, to its valve seat 21, and to its valve stop 22 (see particularly Fig. 2), although there may be instances when the provision of such coatings on the discharge valve of the compressor is deemed unnecessary for the reason that the problem of wear due to impact usually is not as acute with compressor discharge valves as it is with suction valves.

20 The resilient, low-friction coatings 15 may be formed in any suitable manner known in the art, such as by applying PTFE as a slurry or a sprayed liquid upon the surfaces to be coated, and then sintering or baking the

applied coatings. A sintering process for forming PTFE coatings on surfaces is described in U.S. patent specification No. 2,817,562, for example.

WHAT WE CLAIM IS:—

1. A gas-compressor valve arrangement including a suction valve and a discharge valve each comprising stationary valve surfaces and a movable valve member operating thereagainst, characterized in that at least the suction valve has said stationary valve surfaces thereof as well as the surfaces of the movable valve member operating thereagainst coated with a resilient anti-friction material.

2. A gas-compressor valve arrangement according to claim 1, wherein said resilient anti-friction material is polytetrafluoroethylene.

3. A gas-compressor valve arrangement substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawing.

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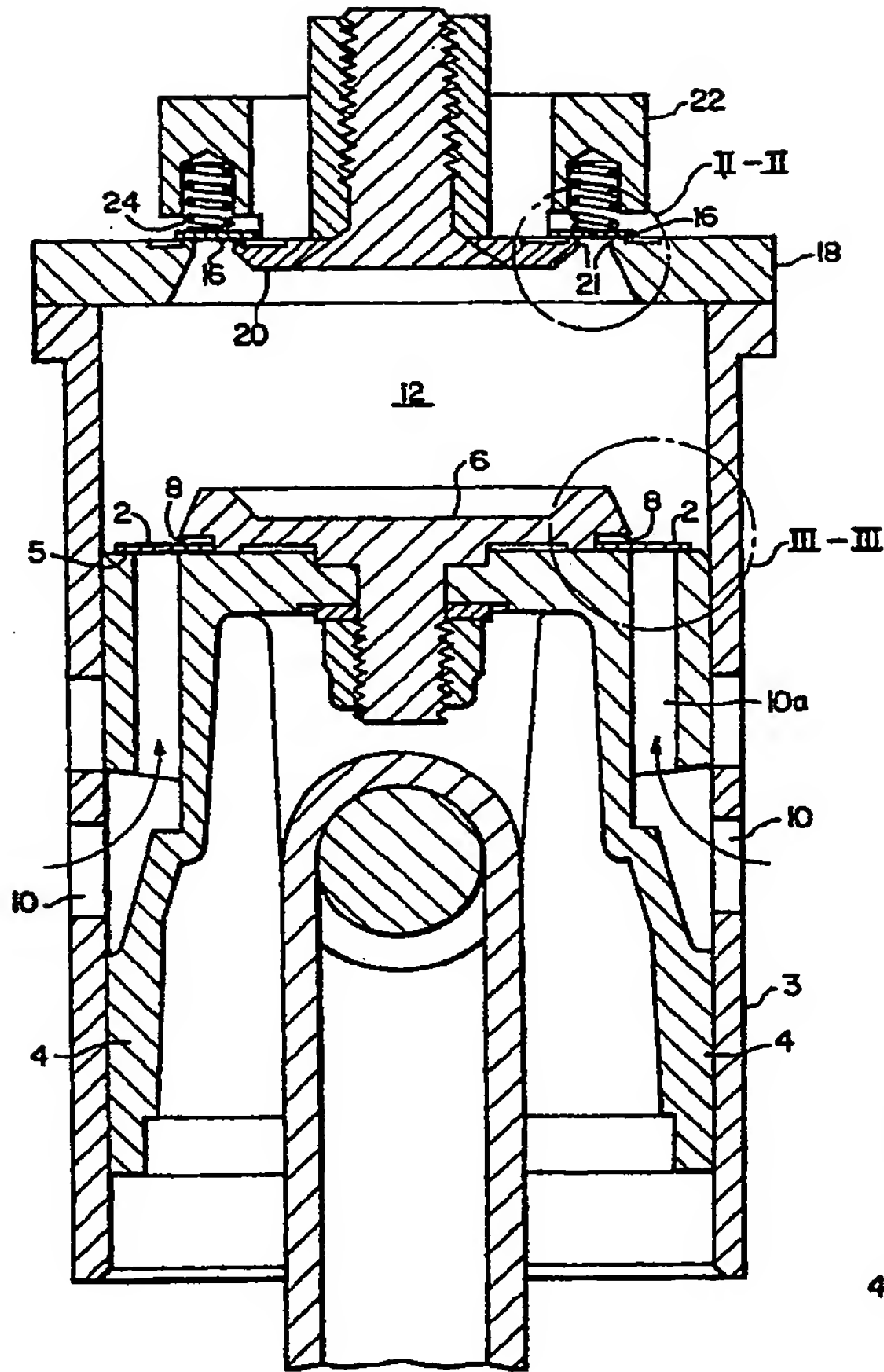


FIG. 1.

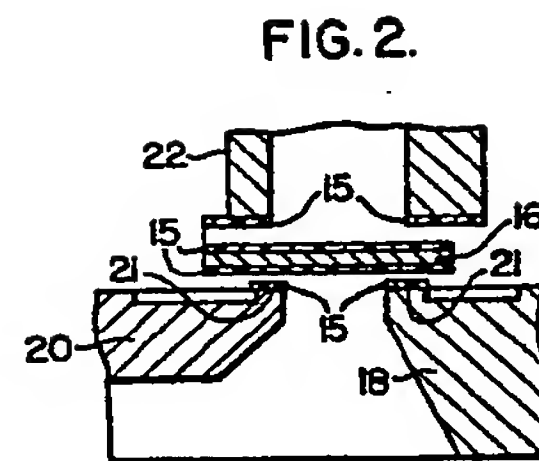


FIG. 2.

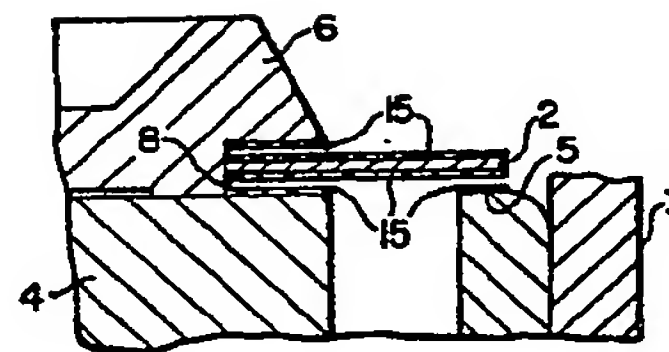


FIG. 3.



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